Milking Parlor Efficiencies:
Labor Benchmarks for Today's Milking Parlor

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Introduction

There are three main reasons why producers are more and more concerned with parlor labor. First, the capital cost of a new parlor is substantial. To spread this cost over as many hundredweights of milk as possible, producers are increasingly operating their parlor as many hours as possible. Consequently, they hire more labor to operate the parlor. Eventually the sheer size of the labor cost associated with the operation of the milking center gets one's attention. The question becomes "Is my parlor labor cost competitive with the rest of the industry?" Second, cows have to be milked at certain intervals (say every 8 or every 12 hours). The rest of the operation has to be in synchrony with the parlor. For example, fresh feed should be in the bunk when cows return from the parlor; pens must be cleaned while cows are being milked, etc. Thus, the parlor and its associated labor are, in essence, the natural clock of a dairy operation. The whole farm is thrown out of kilter when parlor operation disrupts this clock. Third, producers are affected by what I call 'the headache factor'. The more people that are involved in a task, the more likely it is that something will go wrong. Thus, producers want a well-run parlor labor pool to reduce the number of catastrophes and the accompanying headaches.

Physical and Financial Parlor Labor Benchmarks

Most producers understand that labor productivity in the parlor impacts directly on their bottom line. Benchmarks are useful management tools to evaluate the status of a production system or its components. To help producers in assessing the competitive status of their parlor labor pool, we developed a set of benchmarks that we are reporting in Table 1. The minimum benchmarks should be considered thresholds of intervention. Over time, herds should achieve or exceed the competitive benchmarks. The most important benchmark among the five is *parlor labor costs per hundredweight of milk*. Two variables drive this ratio. The numerator is *labor costs per hour*, itself determined by 1) the *average labor cost per hour, per milker*, and 2) the *number of milkers* employed. Thus, the numerator represents the parlor labor expenses per hour. The denominator is the number of hundredweight harvested per hour and measures the overall productivity of the parlor labor pool. The ratio of the two is a good measure of the efficiency of labor in the milk harvesting process.

The other four benchmarks are there to assist in the diagnosis if parlor labor costs per cwt do not meet the objective.

Achieving Satisfactory Turns Per Hour

With side parlors (herringbone and parallels), a major component of parlor efficiency is determined by the number of times each side is filled in an hour. In parlor lingo, this is called the *number of turns per hour*.

- To achieve four turns per hour means that each side is filled (and emptied) with cows four times during an hour.

- Four turns per hour means that a new set of cows enters a side every 15 minutes. Five turns per hour implies a new set of cows every 12 minutes.

Valuable measurements can be made using nothing else than an inexpensive stopwatch.

- Measure the number of minutes between two consecutive openings of the entry gate on the same side of the parlor. Sixty divided by this number will give you the equivalent number of turns per hour.

  Ex. 13.5 minutes elapsed between two consecutive openings of the entry gate on the West side of the parlor.
  $$60 \div 13.5 = 4.44 \text{ turns/hour}$$

Based on the benchmark in Table 1, consecutive openings of the entry gate should occur every 15 minutes maximum.

- Measure the number of minutes that elapses from the time the entry gate is opened until the last milking units is attached on that side. In parlor lingo, this is called *gate up to last unit on* time. To achieve 4 turns per hour, this should be less than 6.5 minutes in a rapid exit parlor and 5.5 minutes in a conventional exit parlor. To achieve 5 turns per hour, the *gate up to unit on time* must drop to 4.5 minutes with rapid exit and 3.5 minutes with conventional exit.

Understanding this measurement is critical to achieving good labor efficiency in the parlor. When the entry gate on side A is open, all parlor labor should focus on that side. Until the last unit of side A is attached, doing other tasks on side B will not improve the number of turns per hour. In a well-operated side parlor, you have a controlled race starting about every 7 minutes. The race boils down to how long it takes to fill the side, prep the cows and attach all units. The faster this is done, the more turns per hour your parlor will achieve.

You are Budgeting Minutes

The analysis of cow throughput is much simplified when one realizes that:

$$1 \text{ hour} = 60 \text{ minutes} = 3600 \text{ seconds}$$

It is how the 3600 seconds per hour is budgeted across all the different tasks that determines parlor throughput from a labor standpoint.

Measuring the amount of time spent on each of the essential and non-essential parlor routine elements is not easy and cannot be done using a simple stopwatch. We have used a data logging device

originally designed by Dr. Larry Jones of F.A.R.M.E. Institute to measure the amount of time spent on a variety of tasks in more than 75 parlors in Ohio, Maryland, Michigan, New York, Pennsylvania, and a few parlors in California. These measurements are of great help in the calculation of an expected parlor throughput based on the specifics of the milking routine.

Parlor tasks are grouped into essential work routine tasks (EWRT) and non-essential routine tasks (NEWRT). There are seven essential elements:

- Enter
- Prep
- Attach
- Reattach
- Detach
- Post treatment
- Exit

Other elements, although some may be necessary (e.g. re-filling the teat-dip bottle, getting fresh towels) are not considered essentials – cows are not required; their timing is very flexible. Table 2 reports benchmarks for all EWRT elements based on measurements that we have made in the last three years pooled with those of Dr. Jones and Dr. Dennis Armstrong of the University of Arizona.

Using this table, it is very easy to establish a benchmark for the number of turns per hour to be expected from a specific milking routine.

Example 1

Herringbone parlor, pre-dipping, forestripping, and post dipping in a rapid exit parlor with automatic take-offs. The EWRT have the following expected times as minimum benchmarks:

	Seconds/Cow
Enter	5
Pre Dip	5
Wipe	7
Forestripping	8
Attach	10
Reattach	1
Post Dip	4
Exit	2
Total EWRT	42
+ 15% misc. and idle	6
Total Time	48

This milking routine takes a total of 48 seconds per cow. Thus, one milker can handle a <u>maximum of</u> 3600 ÷ 48 = <u>75 cows per hour regardless of the parlor size</u>.

Example 2.

Suppose now that we oversize the parlor (e.g. double 20 for one milker) in a herringbone configuration, with pre-spray and wipe, post-spray, rapid exit and arm take offs. The EWRT have the following expected times as minimum benchmarks:

	Seconds/Cow
Enter	5
Pre-Spray	4
Wipe	7
Attach	8
Reattach	1
Post-Spray	3
Exit	2
Total EWRT	30
Misc. and idle time	6
Total time	34

With this milking routine, one milker can handle a maximum of 3600 ÷ 34 = 106 cows per hour.

Some would argue that the unit-on-time would be longer because of the reduced udder stimulation due to the lack of forestripping with this routine. This issue will be addressed in more details later. Even if the lack of forestripping increases units-on-time by 30 to 60 seconds per cow, the time when the units are on a cow (units-on-time) <u>does not require any labor</u>. Thus, as long as the parlor is sized according to the routine, one milker should milk 106 cows per hour using the routine described in this second example. A parlor with 32 herringbone stalls (16 per side) per milker would be well sized for this routine whereas a parlor with 20 to 24 stalls per milker would be more appropriate to the routine of example 1.

Midwestern producers hear of western herds where milkers are reportedly averaging 150+ cows/ milker per hour. How do they do that? The holding area and milking routine in some herds in dry, western areas, are quite different than the standard practices in the Midwest and East Coast. For example, cows may go through a wash pen and are let to dry naturally before entering the holding pen. With this facilities configuration, the milking routine can be:

Example 3.

Parallel parlor, no pre-treatments, no post-treatments (mechanical post-dipping in the return alley), and rapid exit.

	Seconds/Cow
Enter	5
Pre-Dip	0
Wipe	0
Forestripping	0
Attach	10
Reattach	1
Post Dip	0
Exit	2
Total EWRT	18
+ 15% misc. and idle	3
Total time	21

With this milking routine, one milker can handle a maximum of $3600 \div 21 = 169$ cows per hour. A parlor with 40 to 48 stalls per milker would be ideally sized.

In short, if you want to increase the parlor labor efficiency, you either must reduce the time spent for each of the essential tasks, or else, you must cut in the number of tasks done by the labor.

To forestrip or not to forestrip: the $64,000 question

The unsolved question at this point, is what are the losses in udder health and production associated with reduced milking routine? Some producers value udder health and low SCC very highly and argue for a full preparation routine. Forestripping is an example of a strong stimulus for milk letdown. The milk letdown response occurs when oxytocin (a hormone) is released from the pituitary gland in the blood circulation and reaches the mammary gland where it causes contraction of the myoepithelial cells that surround the secretory alveoli. Many stimuli contribute to the release of oxytocin one of which is forestripping (premilking stimulation). Field evidence suggests that forestripping is critical to milk letdown, unit attachment time, peak flow rate, and milk production. Recent scientific studies do not support this. Wagner and Ruegg (2002) found no difference in milk yield, attachment time and flow rate between two pre-milking routines that include or not forestripping. This was true for both high (101.4 lbs/d) and low (57.3 lbs/d) producers. In commercial operations, the consistency in the sequence of events that stimulate milk let-down may be the key. Forestripping may facilitate achieving this consistency, but consistency can be achieved regardless of whether a full udder prep routine is followed or not.

When Things Aren't the Way They Should Be

What do you look for when *turns per hour* aren't what they should? Based on the previous discussion, this means that something is probably wrong with the labor routine. The following are possible causes to long EWRT.

Entry time too high:
- Poor working routine
- Poor design of entry
- Slippery floor
- Poor cow handling

Udder prep time too high:
- Dirty udders
- Poor working routine, equipment
- Parlor layout
- Poor cow handling

Attach time is too high:
- Slow operator
- Lack of routine
- Poor design of equipment
- Kicking cows
- Poor design of parlor

Post-treatment time is too high:
- Work routine (walking)
- Kicking cows
- Location of equipment

Miscellaneous time is too high:
- Too many interruptions
- Not enough automation
- Milker went in the holding area once!
- Too much "special care" in the parlor

Idle time is too high:
- Not enough stalls per milker
- Poor milking routine
- Long milking time per cow
- Poor grouping strategy

Examples of Parlor Throughput Diagnosis

The following 4 figures will be used during the conference to illustrate the diagnosis of insufficient cow throughput and sub-optimal labor efficiency in the parlor.

Conclusions

Because parlor cow throughput has deep ramifications on the rest of the dairy operation and its implication to overall profitability, producers are increasingly looking at techniques and technologies to improve labor efficiency in the parlor. Benchmarks presented in this paper should assist producers in optimizing labor in their parlor.

Table 1. Minimum and competitive benchmarks for parlor labor.

	Minimum Benchmark	Competitive Benchmark
Parlor labor costs per cwt[1]	$0.70	$0.50
Side turns per hour[2]	4	4.5
Cows/milker per hour	80	100
Cwt/milker per hour	20	30
Hourly labor costs/milking stall	$0.75	$0.50

[1]Includes wages, payroll taxes, and benefits of milkers and dairy center supervisor when applicable but does not include labor expenses of cow pushers unless they are actively involved with milking more than 15 minutes per hour. When herd owner and/or unpaid family labor are involved in the milking, a cash-equivalent wage should be used.
[2]Assumes side parlors (Parallel or Herringbone).

Table 2. Suggested minimum benchmarks for time to accomplish essential work routine tasks in parallel and herringbone side parlors.

Activity	Parallel	Herringbone
Essential Work Routine Tasks	------------ sec/cow ---------------	
Enter	4	5
Pre-Spray	4	4
Pre-Dip	5	5
Wipe	6	7
Forestrip	8	8
Attach	10	10
		8 for arm units
Reattach	1	1
Post-Spray	3	3
Post-Dip	4	4
Exit (Rapid Exit)	2	2
(Conventional Exit)	5	6
Misc. and Idle Time	---------- 15% of EWRT --------	

Figure 1. Average time spent on essential and non-essential tasks - **Farm P**
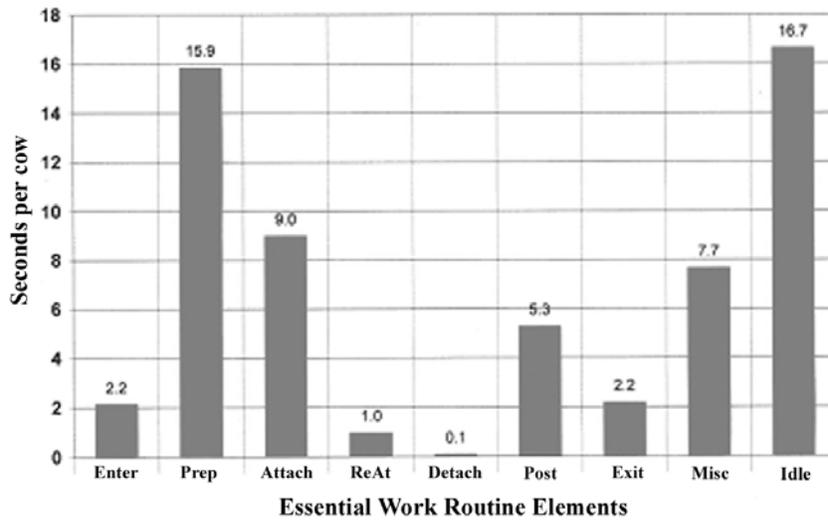

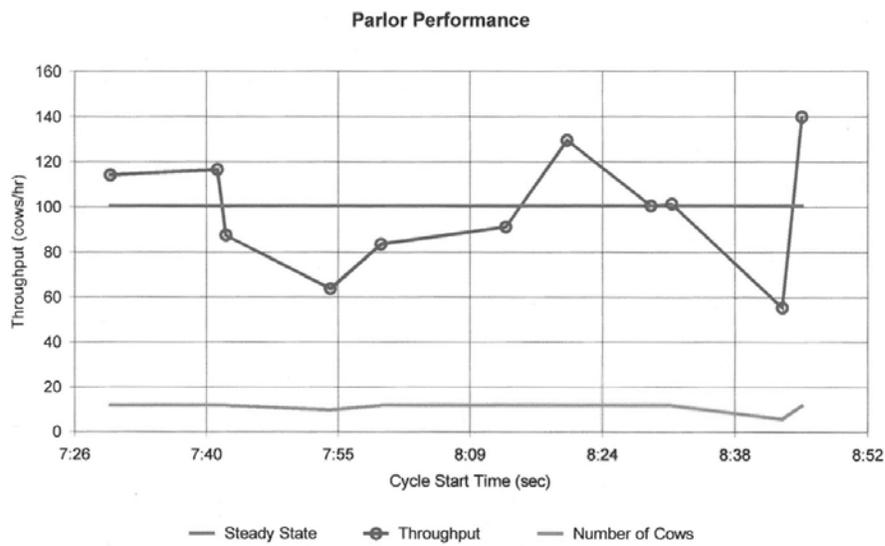Figure 2. Cow throughput as a function of cycle numbers - **Farm P**

Figure 3. Average time spent on essential and non-essential tasks - **Farm S**
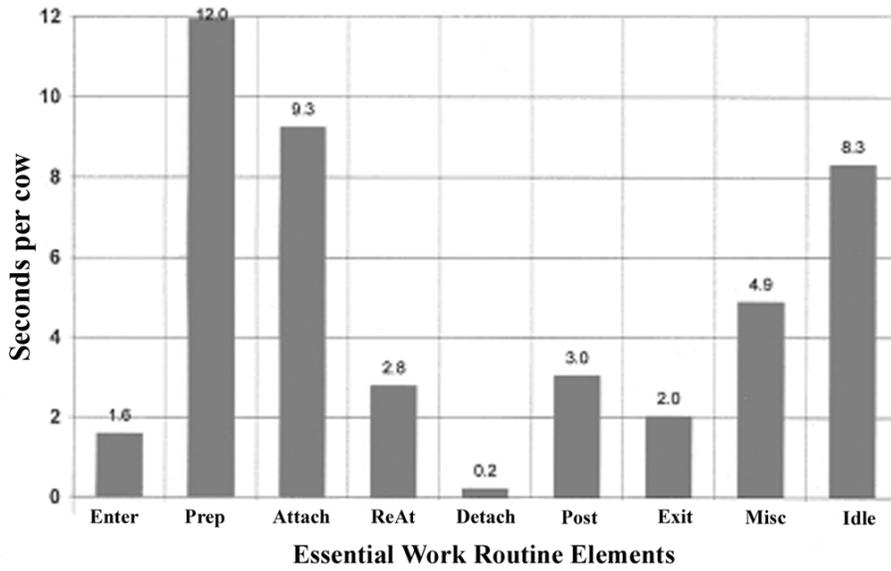

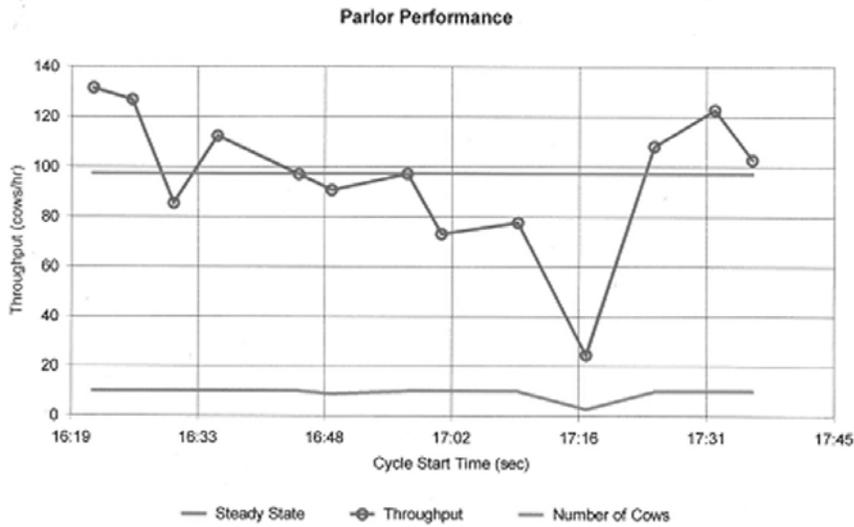Figure 4. Cow throughput as a function of cycle numbers - **Farm S**

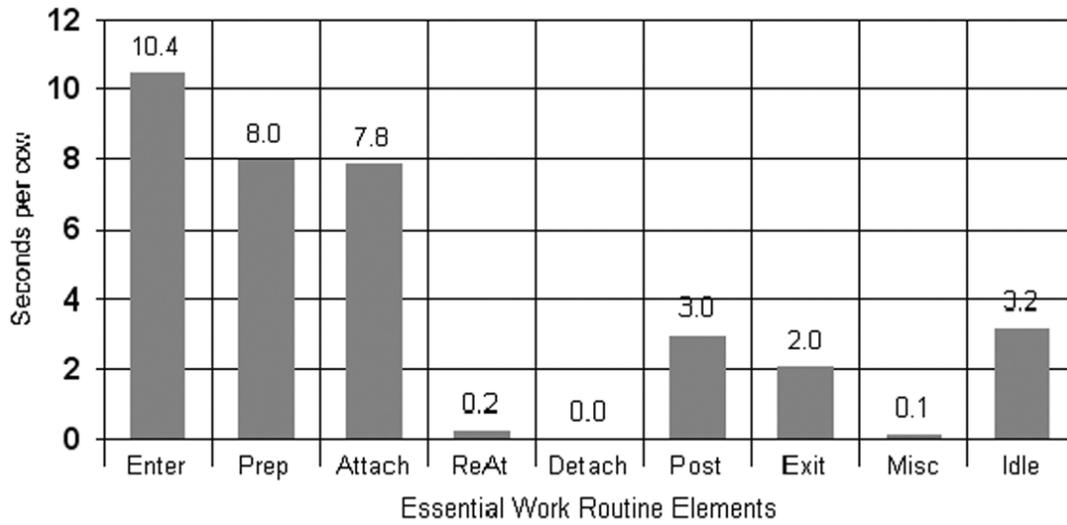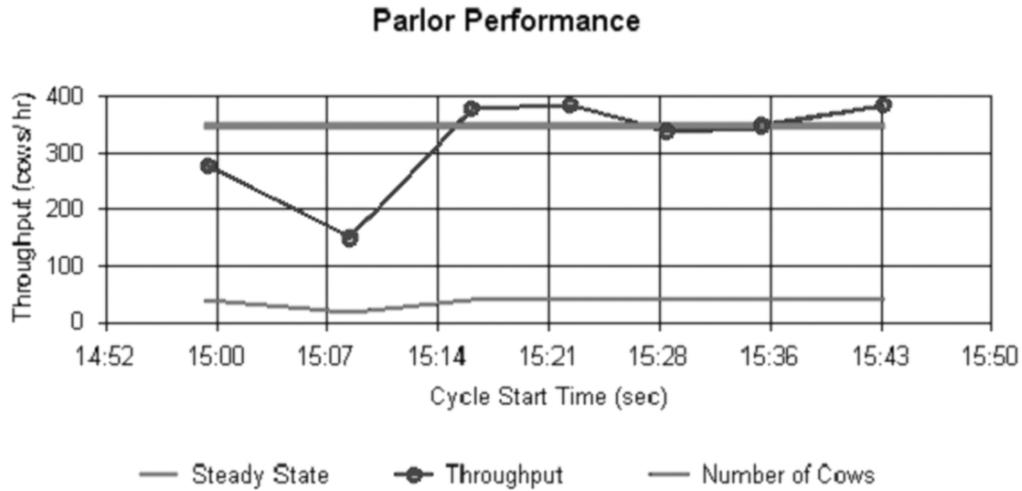Figure 5. Average time spent on essential and non-essential tasks - **Farm St – First Visit.**

Figure 6. Cow throughput as a function of cycle numbers - **Farm St – First Visit.**

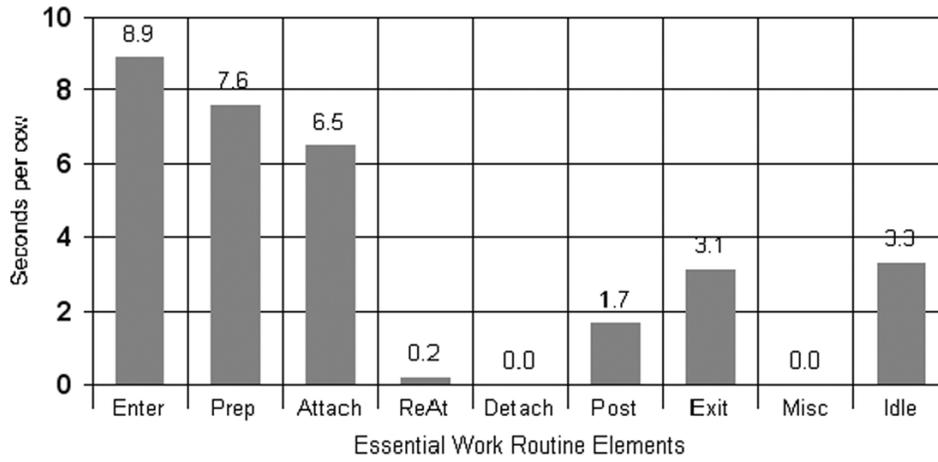Figure 7. Average time spent on essential and non-essential tasks - **Farm St – Second Visit.**

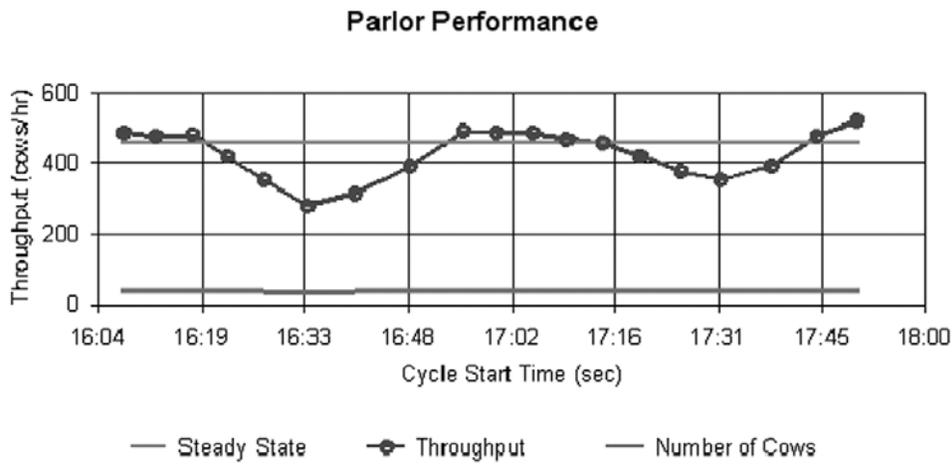Figure 8. Cow throughput as a function of cycle numbers - **Farm St – Second Visit.**

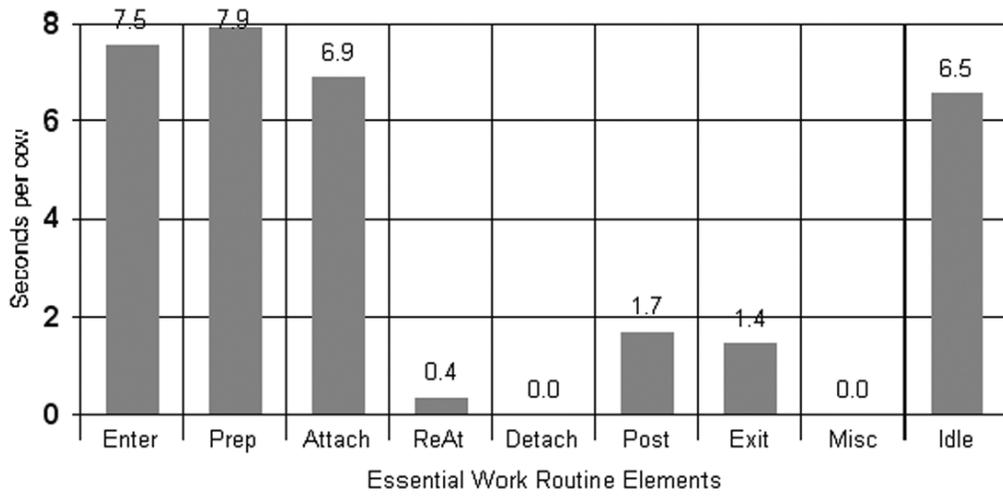Figure 9. Average time spent on essential and non-essential tasks - **Farm St – Third Visit.**

Figure 10. Cow throughput as a function of cycle numbers - **Farm St – Third Visit.**